# The Moderating Effect of Perceived Motor Competence on the Coordinated Development of "Skill-ability" in Youth Soccer Players

Zexin Yuan, Jian Xu*, Shizhe Xing, Haixia Zhu
Dalian University of Technology, Panjin 124000, China
*Corresponding email: xujian@dlut.edu.cn

**Abstract**

In the development of youth soccer talent, the growth of sport-specific skills and motor competence often becomes unbalanced, which directly affects athletes' long-term competitive potential. Such imbalance is not caused solely by training content; psychological mechanisms may also influence developmental trajectories in childhood. This study recruited 124 youth soccer players aged 8-10 years old and used a sport-specific Skill Index (SI), the Motor Competence Assessment (MCA), and the motor competence subscale of the Self-Perception Profile for Children (SPPC) to examine sport-specific skills, motor competence, and perceived motor competence (PMC). The study specifically investigated the moderating effect of PMC on the relationship between skill and ability. The results showed that: (1) Asynchronous development between sport-specific skills and motor competence was common among youth soccer players. (2) PMC was significantly positively correlated with both sport-specific skills and motor competence. (3) PMC exerted a significant negative moderating effect on the relationship between sport-specific skills and motor competence. Specifically, the higher the PMC, the weaker the positive predictive effect of sport-specific skills on motor competence; the lower the PMC, the stronger this effect became. These findings suggest that PMC is a key psychological variable for explaining the coordinated development of skill and ability and should be incorporated into youth training evaluation and program design. It is therefore recommended that an integrated training model combining technique, motor competence, and perception be established to improve the scientific basis and long-term effectiveness of youth talent development.

**Keywords**

Youth soccer players, Perceived motor competence, Sport-specific skills, Motor competence

## Introduction

Childhood is a crucial period for the acquisition of soccer skills, the cultivation of sport interest, and the development of physical capacities. The scientific quality of training during this stage strongly influences an athlete's future competitive potential and sporting longevity. Under the influence of early specialization and an excessive focus on short-term results, grassroots training often develops in one of two extreme directions: Either technical drills are emphasized while foundational motor competence is neglected, or general physical conditioning is stressed while the refinement of sport-specific technique is insufficient [1]. Both tendencies may lead to a separation between sport-specific skills and general motor competence, thereby increasing injury risk and limiting the full expression of technical potential. However, marked differences in developmental trajectories can still be observed among children who receive broadly similar training, which suggests that psychological mechanisms may also play an important part in the matching of skill and ability. Perceived motor competence (PMC), defined as an individual's subjective evaluation of his or her own motor abilities, may therefore help explain why some youth players show coordinated development whereas others do not.

### *Conceptual definitions*

In the present study, sport-specific skills refer to the degree to which an athlete masters technical actions in a particular sport, with emphasis on the technical quality and execution of movements in soccer-specific tasks. Motor competence refers to performance in general movement tasks involving locomotor, manipulative, and

stability-related actions. It reflects such underlying qualities as body control, strength, speed, and balance, and functions as the foundation that supports the learning, transfer, and sustained improvement of sport-specific skills. Perceived motor competence refers to the individual's self-perception, self-evaluation, and belief concerning his or her own level of motor ability. It is a key psychological construct connecting objective performance with motivation, persistence, and training engagement.

***Literature review***

The reciprocal model proposed by Stodden and colleagues suggests that actual motor competence and perceived motor competence interact with each other and jointly shape patterns of physical activity and physical fitness development. Other studies have shown that actual motor competence and perceived motor competence are only weakly to moderately correlated and are not significantly moderated by age or sex, indicating that PMC retains a degree of relative independence [2,3]. Within soccer-related contexts, some scholars have found that fundamental movement skills and self-efficacy can mediate the relationship between motor competence and soccer-specific skills, implying that psychological cognition can reshape the linkage between skill and ability [4]. Latent profile analyses have further shown that children may present combinations such as high actual competence with low perceived competence, or low actual competence with high perceived competence, and that these profiles differ significantly in physical activity participation and skill development [5,6].

In an early-specialization environment, if long-term evaluation systems concentrate mainly on sport-specific indicators, young athletes may gradually equate sport-specific performance with overall ability and thereby overlook the training of foundational motor competence. This process can intensify the separation between skill and ability [7]. On this basis, the present study proposed three hypotheses: First, that sport-specific skills and motor competence would develop asynchronously in youth soccer players. Second, that PMC would be positively associated with both sport-specific skills and motor competence. Third, that PMC would significantly moderate the relationship between sport-specific skills and motor competence.

**Participants and methods**

***Participants***

The study recruited 124 youth soccer players aged 8-10 years old who had each received at least two years of systematic training. The sample included 68 boys and 56 girls, with a mean age of 8.98±0.86 years old. All participants had been free from serious sports injuries or illnesses that might affect testing during the previous three months. Written informed consent was obtained from both parents and participants before data collection.

***Measurement instruments and procedures***

Sport-specific skills were assessed using the Skill Index (SI), which was derived from two soccer-related tasks: a non-ball agility test (AT) and a slalom dribbling test (SDT) with the ball. The index was calculated using the formula SI=AT/SDT, and the reliability of this index had been previously verified. Motor competence was assessed using the Motor Competence Assessment (MCA) system proposed by Portuguese researchers [8]. The MCA includes six test items covering the three domains of locomotor competence, manipulative competence, and stability, and it provides a comprehensive representation of children's overall motor competence. Perceived motor competence was measured with the motor competence subscale of the Self-Perception Profile for Children (SPPC), which has demonstrated good reliability and validity in previous studies [9]. Recent advances in deep learning have also enabled accurate video-based analysis of key motion positions, providing technical support for objective motor skill assessment [10].

***Data analysis***

All analyses were conducted in SPSS 26.0. The statistical procedures included:

(1) Descriptive statistics and tests of normality.

(2) Pearson correlation analysis, or Spearman correlation analysis when the data did not meet assumptions of normality.

(3) Quartile analysis to determine whether a mismatch existed between sport-specific skills and motor competence.

(4) Hierarchical regression analysis to test the moderating role of PMC by entering sport-specific skills (SSS), PMC, and the interaction term SSS × PMC step by step.

(5) Simple slope analysis based on grouping participants into high-PMC and low-PMC categories according to PMC ± 1 standard deviation. The significance level was set at α=0.05.

## Results

### *Developmental status of motor competence and sport-specific skills*

As shown in Tables 1-3, the six motor competence indicators generally improved with age. Boys outperformed girls in lateral jumps, moving platforms, standing long jump, kicking speed, and throwing speed, with a notable increase appearing in the 10-year-old group. Girls performed better in the shuttle run. In terms of the composite dimensions of motor competence, boys showed significant age-related increases in stability, manipulative competence, and overall motor competence, whereas girls maintained a relative advantage in locomotor competence but showed slower growth. For sport-specific skill tests, the completion time for the ball-dribbling task decreased with age, and boys showed a greater rate of improvement. In the non-ball test, girls displayed more obvious progress. With regard to the composite sport-specific skill score, boys showed a steady increase from ages 8 to 10, whereas girls remained relatively stable.

Such divergent developmental patterns suggest gender as a key factor in youth soccer players' motor and skill development. These findings also underscore the need for gender-specific training programs for children aged 8-10 years.

Table 1. Descriptive statistics of six motor competence test items by age and sex.

| Indicator | 8 years old | | 9 years old | | 10 years old | |
|---|---|---|---|---|---|---|
| | Boys | Girls | Boys | Girls | Boys | Girls |
| Lateral jumps (score) | 38.19±4.53 | 37.10±3.28 | 39.39±4.13 | 37.55±2.91 | 41.29±3.17 | 37.55±2.91 |
| Moving platforms (score) | 10.77±1.27 | 10.25±0.97 | 11.33±1.37 | 11.25±1.13 | 12.33±1.40 | 11.10±1.37 |
| Shuttle run (m/s) | 12.28±1.06 | 12.88±0.94 | 12.08±0.75 | 13.10±0.92 | 11.77±0.96 | 12.72±0.37 |
| Standing long jump (cm) | 153.58±13.94 | 151.30±9.92 | 156.56±14.62 | 159.25±11.23 | 172.10±20.44 | 165.45±8.09 |
| Kicking speed (m/s) | 39.69±4.43 | 38.25±5.56 | 43.33±4.91 | 41.25±4.86 | 47.04±5.68 | 41.60±3.10 |
| Throwing speed (m/s) | 41.69±5.18 | 41.20±3.35 | 42.94±4.36 | 41.19±3.90 | 47.75±6.95 | 39.90±2.97 |

Note: All numerical values were retained exactly as provided in the source manuscript.

Table 2. Descriptive statistics of the dimensions of motor competence by age and sex.

| Indicator | 8 years old | | 9 years old | | 10 years old | |
|---|---|---|---|---|---|---|
| | Boys | Girls | Boys | Girls | Boys | Girls |
| Stability competence | 0.35±1.73 | −0.50±1.06 | 0.35±1.73 | −0.50±1.06 | 1.55±1.67 | −0.29±1.40 |
| Manipulative competence | 0.31±1.57 | −0.38±1.20 | 0.31±1.57 | −0.38±1.20 | 1.87±2.10 | 0.56±0.96 |
| Locomotor competence | −0.56±0.90 | 0.65±1.10 | −0.56±0.90 | 0.65±1.10 | 0.11±1.16 | 0.66±0.57 |
| Motor competence | 0.10±2.88 | −0.24±1.78 | 0.10±2.88 | −0.24±1.78 | 3.52±3.68 | 0.19±1.99 |

Note: The repeated values for some age groups were retained exactly as they appeared in the source text.

Table 3. Descriptive statistics of sport-specific skills by age and sex.

| Indicator | 8 years old | | 9 years old | | 10 years old | |
|---|---|---|---|---|---|---|
| | Boys | Girls | Boys | Girls | Boys | Girls |
| Non-ball test (s) | 10.31±0.74 | 11.27±0.81 | 10.03±1.36 | 10.6±1.01 | 10.09±1.18 | 10.24±0.75 |
| Ball test (s) | 15.71±1.63 | 16.75±1.36 | 14.86±2.33 | 15.95±1.6 | 13.82±1.44 | 15.42±1.17 |
| Sport-specific skills (score) | 0.66±0.06 | 0.67±0.04 | 0.68±0.06 | 0.67±0.05 | 0.73±0.06 | 0.67±0.05 |

Note: Sport-specific skills were calculated from the non-ball agility test and the ball-dribbling test.

***Mismatched development between sport-specific skills and motor competence***

To further examine whether sport-specific skills and motor competence developed in a mismatched manner among 8-10-year-old soccer players, all participants' scores for motor competence and sport-specific skills were ranked in ascending order and then divided into quartiles. The overlap rate of the same participant appearing in the same quartile on both assessments was then calculated to reflect the synchrony and consistency of the two developmental dimensions. As shown in Table 4, the overlap rate was highest in the third quartile, but even there it reached only 44.83%. The overlap rates in the other quartiles were 40.63%, 38.71%, and 28.13%. These findings indicate that the two evaluation systems did not show a satisfactorily high degree of matching. In practical terms, even in the third quartile with the highest concordance rate, 55.17% of participants showed asynchronous development between sport-specific skills and motor competence, indicating a widespread state of mismatched development.

Table 4. Quartile analysis of motor competence and sport-specific skills.

| Quartile | Total participants | Overlapping participants | Overlap rate |
|---|---|---|---|
| First quartile | 32 | 9 | 28.13% |
| Second quartile | 32 | 13 | 40.63% |
| Third quartile | 29 | 13 | 44.83% |
| Fourth quartile | 31 | 12 | 38.71% |

***Status of perceived motor competence***

The results of the Mann-Whitney U test and independent-samples t test showed that there were no significant sex differences in perceived motor competence among the 8-year-old, 9-year-old, and 10-year-old groups. Boys' PMC scores rose slightly with age, whereas girls showed no obvious change (see Table 5). This pattern suggests that PMC does not vary in a simple linear manner across age and sex during this stage of development [11].

Table 5. Descriptive statistics of perceived motor competence by age and sex.

| Age (years old) | Girls (M±SD) | Boys (M±SD) | Z/t | p |
|---|---|---|---|---|
| 8 | 35.65±3.44 | 35.65±4.86 | −0.167[a] | 0.867 |
| 9 | 37.39±4.35 | 36.94±5.00 | 0.281 | 0.782 |
| 10 | 36.15±4.72 | 37.46±4.67 | −1.052[a] | 0.293 |

Note: The superscript marker "a" was retained exactly as shown in the original source.

***Correlations among sport-specific skills, motor competence, and PMC***

As shown in Table 6, perceived motor competence was significantly and positively correlated with sport-specific skills ($r=0.248$, $p<0.05$) and with motor competence ($r=0.188$, $p<0.05$). The correlation coefficient between sport-specific skills and motor competence was 0.177 ($p<0.05$). These results clearly indicate that the three variables were meaningfully related and formed a cohesive and interconnected system rather than three separate and independent dimensions.

Table 6. Correlation matrix of sport-specific skills, motor competence, and perceived motor competence.

| Variable | Sport-specific skills | Motor competence | Perceived motor competence |
|---|---|---|---|
| Sport-specific skills | 1.000 | 0.177* | 0.248* |
| Motor competence | 0.177* | 1.000 | 0.188* |
| Perceived motor competence | 0.248* | 0.188* | 1.000 |

Note: * $p<0.05$.

***Moderating effect of perceived motor competence***

Hierarchical regression analysis showed that the interaction term between sport-specific skills and perceived motor competence had a significant negative effect on motor competence ($\beta=-0.164$, $p<0.05$). With the addition of PMC and the interaction term, the model

$R^2$ increased from 0.338 to 0.383. This means that when PMC is relatively high, the positive predictive effect of sport-specific skills on motor competence becomes weaker. In contrast, when PMC is lower, the predictive relationship between sport-specific skills and motor competence tends to be stronger.

Table 7. Hierarchical regression analysis of the moderating effect of perceived motor competence.

| Model | Variable | β | t | SE |
|---|---|---|---|---|
| Model 1 | SSS | 0.057 | 0.715 | 4.449 |
| Model 2 | SSS | 0.022 | 0.272 | 4.514 |
| Model 2 | PMC | 0.150 | 1.926 | 0.056 |
| Model 3 | SSS | 0.033 | 0.414 | 4.457 |
| Model 3 | PMC | 0.146 | 1.906 | 0.055 |
| Model 3 | SSS×PMC | −0.164* | −2.126 | 0.924 |
| / | $R^2$ | 0.338 | 0.359 | 0.383 |
| / | Adjusted $R^2$ | 0.304 | 0.320 | 0.340 |
| / | F value | F(6,117)=9.970** | F(7,116)=9.274** | F(8,155)=8.926** |

Note: ** p<0.01. SSS = sport-specific skills; PMC = perceived motor competence.

***Simple slope analysis***

Participants were divided into high-PMC groups and low-PMC groups using PMC ± 1 SD, and a simple slope analysis was then performed. The results showed that in the high-PMC group, the slope predicting motor competence from sport-specific skills was − 7.031 (p=0.236). Although this effect did not reach statistical significance, it showed a negative trend. In the low-PMC group, the slope was 10.724 (p=0.092), indicating a positive trend. These findings further suggest that when perceived motor competence is low, sport-specific skills and motor competence are more tightly linked, whereas when PMC is high, the relationship between the two becomes more diffuse (see Figure 1 and Table 8).

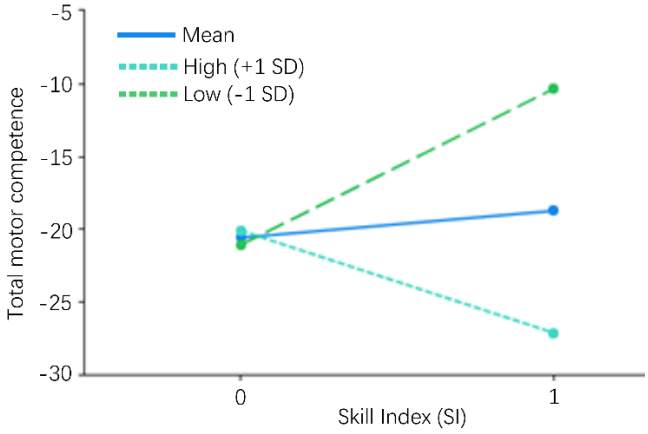


Figure 1. Simple slope analysis of perceived motor competence.

Table 8. Simple slope analysis of perceived motor competence.

| PMC level | β | SE | t | p | 95% CI |
|---|---|---|---|---|---|
| High (+1 SD) | −7.031 | 5.904 | −1.191 | 0.236 | −18.726 to 4.664 |
| Mean (M) | 1.847 | 4.457 | 0.414 | 0.679 | −6.981 to 10.675 |
| Low (−1 SD) | 10.724 | 6.303 | 1.702 | 0.092 | −1.760 to 23.209 |

**Discussion**

The present study confirmed that perceived motor competence plays a significant negative moderating role in the coordinated development of skill and ability among youth soccer players. A high level of PMC does not necessarily lead to a better match between sport-specific skills and motor competence.

Rather, when children overestimate their own overall motor ability, the positive linkage between technical performance and foundational movement competence may become weaker.

This result is important for youth training because it suggests that psychological self-perception is not merely an accompanying factor but a variable that can reshape the developmental pathway of young athletes.

Recent studies have repeatedly shown that actual motor competence and perceived motor competence can become disconnected. Research based on middle-childhood samples has demonstrated that

children with a high-PMC but low-actual-competence profile may differ from other groups in physical activity choice, training engagement, and the development of healthy movement habits. Other studies have also indicated that children with both high actual and perceived competence, or both low actual and perceived competence, differ significantly in body mass index and physical activity level [12]. Taken together, these findings are broadly consistent with the present results and suggest that PMC likely influences training motivation, effort allocation, and behavioral choices in youth soccer settings as well [13].

In the context of soccer, PMC appears to enter a cyclical relationship with both motor competence and sport-specific skills. On the one hand, better skill performance may strengthen self-perception and confidence. On the other hand, excessively high or low self-perception may alter the direction and quality of training input. For example, when children place too much confidence in their apparent technical performance, they may underestimate weaknesses in balance, locomotion, coordination, or object-control ability. Conversely, when self-perception is too low, children may reduce initiative, persistence, and emotional investment in training even if their underlying capacities are sufficient for improvement. Therefore, either overestimation or underestimation may change the way young athletes engage with training tasks and may ultimately affect the coordination between skill and ability.

Another important implication of this study is methodological. A single technical indicator is not enough to capture the comprehensive development of youth soccer players. If evaluation systems continue to focus mainly on match performance or specialized technical scores, coaches may overlook the developmental significance of general motor competence and of children's perception of their own ability. The current findings support the inclusion of multidimensional evaluation and feedback mechanisms in youth training systems so that coaches can monitor not only what young athletes can do, but also how they understand their own capacities.

From a practical perspective, the findings support a training model that integrates technique, motor competence, and perception. Youth soccer programs should systematically include fundamental movement training alongside technical practice and should provide developmentally appropriate feedback that helps children build a more accurate understanding of their strengths and weaknesses. Objective performance feedback, diversified training contexts, and structured self-evaluation can all help reduce bias in self-perception. Such an approach may make talent development more scientific, reduce the risk of one-sided specialization, and support long-term athletic growth.

**Conclusion**

Among 8-10-year-old youth soccer players, asynchronous development between sport-specific skills and general motor competence is common. Perceived motor competence is significantly positively correlated with both sport-specific skills and motor competence, but its level does not change in a simple way across sex or age. More importantly, PMC significantly moderates the relationship between sport-specific skills and motor competence. Specifically, a high level of PMC weakens the positive relationship between the two, whereas a low level strengthens it.

First, youth training systems should establish an integrated three-dimensional model of technique, motor competence, and perception. In addition to sport-specific technical training, systematic training aimed at improving motor competence should be incorporated, while athletes should also receive guidance that helps them form accurate self-evaluations. Second, training evaluation and feedback mechanisms should be optimized. Assessment should not rely solely on match performance or sport-specific indicators; it should also include interviews or questionnaires on perceived competence as well as benchmark standards for foundational motor competence. This would help avoid the misconception that sport-specific performance is equivalent to overall ability. Third, interventions should be differentiated according to PMC level. For athletes with excessively high PMC, objective data feedback and diverse training situations should be used to help them recognize deficits in their foundational abilities. For athletes with low PMC, positive feedback and experiences that strengthen self-efficacy should be emphasized so as to prevent reduced training engagement and underinvestment in development.

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**Conflict of Interest**

The authors declare no conflict of interest.

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